Advancing Resource Management at Fitchburg State College (Fitchburg, MA)

1. OVERVIEW

Fitchburg State, a four-year public college in Central Massachusetts, offers a wide variety of professional and liberal arts programs at both the graduate and undergraduate levels, emphasizing an interdisciplinary liberal arts and sciences core with all professional and arts and sciences majors. Designated as Massachusetts' "Leadership College", Fitchburg State's campus consists of approximately 30 buildings on 35-acres of grounds. The College enrollment is approximately 2,500 students in its day division and another 3,000 students in its evening and graduate programs, with 375 faculty and staff, and an endowment of $7 million. Fitchburg State's Facilities Maintenance Department is responsible for managing trash and recycling services provided by its contractor.

2. BASELINE SOLID WASTE AND RECYCLING SERVICES AND LEVELS

One contractor is responsible for all trash and recycling services provided to Fitchburg State College (henceforth referred to as Fitchburg). For its trash service, Fitchburg is provided containers of assorted capacities and waste hauling/disposal service on a regularly scheduled basis (Table 1). Recycling service is currently limited to mixed paper, although Fitchburg is considering expanding its contracted services to divert corrugated cardboard. Recycling pick-up is currently limited to four locations on campus, with some consolidation from other satellite locations (Table 2). Work-study students collect paper recyclables twice a week during the school year, and this task is performed on an as needed basis by custodial staff during the summer.

The number of containers at each location is well documented (Tables 1 and 2), however, the service levels for both trash and recycling were difficult to assess because trash and recycling tonnages and pick-up dates/frequencies were not all documented with invoices or other means, nor is this data tracked by Fitchburg. Fitchburg did indicate that both trash and recycling service is reduced during the summer months and it is logical for the contractor to reduce service levels during the summer months because it is paid a flat monthly rate in which it reaps the benefits of any operational cost savings. However the contractor could not quantify the variability in pick-up levels with seasonal fluctuations in campus activity. Ultimately, it is not clear whether Fitchburg is using all the "capacity" they are paying for. Table 1 lists the estimated pick-up frequency based on numbers provided.

Table 1: Fitchburg State Estimated Trash Disposal Capacity

Building	Container Size (cubic yards)	Number	Pick-up Frequency/ week	Annual Service Capacity (1) (Cubic yards)	Est. annual tonnage capacity (2)
Aubuchon Hall	10	1	5	2600	130
	6	1	2	624	31
Mara Village	6	2	5	3120	156
Herihly Hall	1.5	6	5	2340	117
Townhouses	4	1	5	1040	52
Highland Ave	2	3	5	1560	78
McKay School	4	1	5	1040	52
	1.5	5	5	1950	98
Recreation Center	2	1	5	520	26
Percival Hall	1.5	3	5	1170	59
Dupont	2	1	5	520	26
Parkinson Gym	1.5	1	5	390	20
Hammond Building	2	1	5	520	26
	1.5	1	5	390	20
Condike Science	1.5	2	5	780	39
Total				18564	928

(1) For 52 weeks per year of service

(2) Assumes 100 pounds (0.05 tons) per cubic yard. Source: USEPA Solid Waste and Emergency Response, 1997, *Measuring Recycling: A Guide for State and Local Governments*, EPA530-R-97-011, Appendix B: Standard Volume-to-Weight Conversion Factors (adjusted from uncompacted municipal waste). Verified by contractor representative personal communication and College and University Recycling Council (CURC) data.

Table 2: Fitchburg State Estimated Mixed Paper Recycling Capacity

Building	Container Size (gallons)	Number	Net Capacity (cubic yards) (1)	Pick-up Frequency/week	Annual Service Capacity (cubic yards)	Est. tonnage capacity per year (2)
Anthony	96	16	8	1	416	79
McKay School	96	8	4	1	208	40
Conlon	96	10	5	1	260	49
Pearl Street	96	8	4	1	208	40
Total		42	21		1092	207

(1) Assumes 0.5 cubic yards per 96-gallon toter. Source: contractor personal communication.

(2) Assumes 380 pounds per cubic yard. Source: USEPA Solid Waste and Emergency Response, 1997, Measuring Recycling: A Guide for State and Local Governments, EPA530-R-97-011, Appendix B: Standard Volume-to-Weight Conversion Factors (mixed paper).

3. BASELINE CONTRACTS AND COMPENSATION

Fitchburg's solid waste and recycling profile is typical of many small commercial and institutional settings, employing a simple bid procedure specifying locations and estimated service requirements, for which prospective contactors submit monthly and annual bids. These bids are "bundled", and incorporate the costs of container rental, trash hauling, and disposal. Paper pick-up, hauling, and recycling are provided at no charge, and Fitchburg receives no credit or revenue for its recycled paper. Note that recycling is not broken out as a separate contract or contract component, but is regarded as a "free" service.

Fitchburg has in place two contracts for its trash services. One is intended to cover residential requirements, while the other manages the disposal requirements of the academic buildings. For the residential contract,[1] Fitchburg pays $2,628 monthly ($31,530 per year), and for the academic building contract, Fitchburg pays $2,295 monthly ($27,540 per year) for a net annual total of $59,070 for all trash services. The contractor is paid a monthly sum for each contract, with no line item charges for specific services rendered. If one assumes that all estimated disposal capacity is used (~928 tons, see Table 1), this amounts to $64 per ton disposed. If 75% of its disposal capacity is being used, giving consideration to the summer slowdown, this price would increase to $85 per ton. Because service levels and tonnage could not be quantified, it is not clear whether Fitchburg uses all the capacity they are paying for. In reality, utilization of disposal capacity may be even less than 75%, further inflating per unit cost for trash service.

Under current arrangements, the contractor has no motive to increase recycling relative to garbage service levels. The contractor is paid a flat monthly bundled fee that provides no incentive for higher diversion. Moreover, Fitchburg has no visibility into its service levels or what it pays per unit, and cannot ratchet down its costs by diverting more material. As a result of these two factors, strategies that could substantially improve Fitchburg's recycling efforts are not pursued very aggressively.

4. OPPORTUNITIES FOR COST SAVINGS AND ENHANCED RECYCLING SERVICES

To estimate baseline waste and recycling *capacity* for Fitchburg, service levels in the contracts were estimated and densities for specific materials were calculated to derive approximate annual tonnage capacity. Table 1 provides estimated trash disposal capacity, while Table 2 calculates estimated paper recycling capacity. [2]

[1] Includes all trash services at Aubuchon Hall, Mara Village, Herihly Hall, Townhouses, and Highland Avenue.

[2] Fitchburg's net recycling and disposal capacity is estimated at 1135 tons based on documented containers and service levels. For comparative purposes, using Harvard University's 2000 per capita generation figures (786 pounds/person) for ~3,500 FTEs (factoring in part-time students and staff) produces an estimate of 1375 tons net generation for Fitchburg (20% higher). More comprehensive data is required to more accurately document the baseline.

Paper recycling is estimated at 18% of net capacity, while paper is estimated to be over 31% of the waste stream.[3] This presents a significant opportunity for Fitchburg to replace some of its trash capacity with mixed paper recycling capacity to handle the large volume of recyclable paper that Fitchburg currently disposes.

Under a new contract containing separate and more detailed trash and recycling charges, it is likely that Fitchburg can economize substantially and achieve higher diversion levels. Trash charges generally include a container charge, hauling charge and a tip fee. Container and haul charges may be reduced, and the tip fee would be avoided altogether by recycling a higher percentage of paper that is currently disposed. Recycling charges may include a haul fee, which is generally equal to or less than trash hauling on a per unit basis due to off-setting commodity revenues (either applied as a discount or directly credited to the customer). Therefore Fitchburg could replace some trash containers with recycling containers. Table 3 provides a hypothetical example of a relatively simple modification of the current program that, in conjunction with a modified pricing structure, could be cost neutral or a cost saving proposition for Fitchburg while increasing diversion of paper. Because collection of recyclable paper relies on virtually the same technology and operations as garbage pick-up (i.e., large containers and compacting vehicles), paper recycling could probably be provided at or below the cost of garbage collection service costs.

For buildings with more than one disposal container (see Table 1), some of this capacity could be replaced with 96-gallon paper recycling totes. In other buildings, limited disposal capacity could be supplemented with 96-gallon recycling containers, as indicated in Table 3.[4] This would result in an increase in recycling capacity by 143 tons to 350 tons from the current estimated capacity of 207 tons (a 69% increase), which should be more than adequate to deal with the estimated mixed paper generated by Fitchburg. Replacing the disposal capacity with paper recycling would also decrease disposal capacity by 290 tons (a 31% decrease). Assuming trash charges of approximately $85 per ton, Fitchburg would save an estimated $18,500 on the tonnage diverted (31% of total service base of $59,070) as a result of the above actions. This assumes that 25% of the trash costs are fixed, and 75% are variable with tonnage.

These actions would also make recycling more convenient for custodial staff, other staffers, faculty, and students by means of more visible and central recycling container placement. Moreover, it may limit the prominence and convenience of trash receptacles, positively affecting disposal/recycling habits.

[3] By weight (before recycling), based on waste stream profiling performed by Harvard University in 2000 and supported by California Integrated Waste Management Board Waste Composition study (http://www.ciwmb.ca.gov/WasteChar/BizGrpCp.asp).

[4] Note that buildings expected to be small paper generators, such as recreation and sports facilities, were omitted from this assessment

Table 3: Potential Increase in Paper Recycling by Replacing Disposal Capacity with Recycling Totes

Building	Container Size (gallons)	Number Added (recycling totes)	Net Capacity (cubic yards)*	Pick-up Frequency/ week	Annual Add. Service Capacity (cubic yards)	Est. capacity increase per year (tons)	Reduction in Disposal Capacity (tons)	Actions Taken
Aubuchon Hall	96	8	4	1	208	40	31	Replace (1) 6 cu.yd. container
Mara Village	96	4	2	1	104	20	78	Replace (1) 6 cu.yd. container
Herihly Hall	96	3	2	1	78	15	59	Replace (3) 1.5 cu.yd. containers
Townhouses	96	1	1	1	26	5	N/A	No disposal reduction, supplemental recycling container
Highland Avenue	96	2	1	1	52	10	26	Replace (1) 2 cu.yd. container
McKay School	96	8	4	1	208	40	39	Replace (2) 1.5 cu.yd. containers
Percival Hall	96	1	1	1	26	5	20	Replace (1) 1.5 cu.yd. container
Hammond Building	96	1	1	1	26	5	20	Replace (1) 1.5 cu.yd. container
Condike Science	96	1	1	1	26	5	20	Replace (1) 1.5 cu.yd. container
Total		16	15		754	143	291	
				Net Recycle Capacity (change)	1846	350 (69%)		
						Net Disposal Capacity (change)	637 (-31)	

By reducing the trash capacity and increasing the recycling capacity, there is a net reduction in material handling capacity of 150 tons (capacity reduced by 290 tons, recycling increased by 143). However, even diverting a moderate amount of organic waste, such as food waste from cafeterias, and landscaping refuse, would compensate for any capacity deficit that is created by these actions. Other institutions have arranged livestock feed programs with local farmers to make use of organic waste at a fraction of the cost of traditional disposal. In addition, waste contractors' composting operations are now becoming more prevalent and cost competitive. Organics typically represent from 40-50% of waste stream composition in a University setting (~400-450 tons in Fitchburg's case), and present another opportunity to increase diversion and create avoided disposal costs if future contracts are arranged in such a new as to have these savings flow back to Fitchburg.

Fitchburg's current contract, however, constrains both the contractor and the College's motives to increase recycling/diversion and reduce disposal. The above opportunities for Fitchburg will only arise by revisiting and remodelling its contracts to incorporate a higher degree of transparency and the "right" price signals to engage and provide profitable opportunities for the contractor and incentives for other stakeholders (e.g., students, facilities staff, management) through gain-sharing.

5. REALIZING COST EFFECTIVE RECYCLING AND REDUCTION POTENTIAL WITH RM CONTRACTING

In order to achieve higher resource efficiency (i.e., recycling, composting, and source reduction), there are several RM practices that can be followed to further institutionalize RM (Table 4). These practices would align the interests of Fitchburg State, the contractor, and other stakeholders in pursuit of higher levels of resource efficiency by establishing a compensation/reward mechanism based on performance and continuous service improvement. The first practice, establishing a baseline of current cost, performance, and service levels (e.g., tonnage disposed and recycled by material) is the cornerstone on which the remainder of the practices are built, and could be initiated with data in this memo. This baseline provides the foundation for implementing Practices 2-6, which are essential components of developing a full-scope RM program.

Based on the practices identified above, an assessment was conducted to determine the extent to which RM practices were being employed either in contracts or internally at Fitchburg State. We believe there is potential to adopt the remaining RM contracting practices to focus on reducing disposal capacity and increasing recycling of mixed paper, and a broader scope of materials, including organics, as a cost neutral (or even cost saving) proposition for Fitchburg State.

1. *Establish baseline cost, performance, and service levels.* The service baseline for trash and recycling service is not thoroughly documented by the contractor or Fitchburg. The monthly cost structure, container locations, and service levels for the contract are documented; however, information pertaining to actual service levels during the academic year and summer, and tonnages for recycling and waste are not documented, since compensation is not dependent on this information. The lack of timely information regarding service levels and tonnage makes monitoring recycling improvement and waste reduction virtually impossible. Furthermore, if Fitchburg decides to persue an RM contract, a comprehensive baseline will be required to establish equitable compensation and to evaluate bids received.

2. *Rethink Contractor Roles and Relationships.* Under the current contract, there is an "out-of-sight, out-of-mind" disposition in which reactive communication occurs only when something has gone wrong. RM contracting leads to a natural development of a strategic partnership since the contractor's profitability now rests in leveraging its expertise in cooperation with Fitchburg staff to increase recycling and achieve waste reduction goals. Under its current contract, in which the recycling service has been handled as an add-on to trash service, there is a limited opportunity and incentive to create a partnership for recycling improvement.

If RM is implemented, the contractor should be given latitude to engage faculty, other staff, and students in the planning process. These groups are necessary stakeholders that may have ideas for improving resource efficiency or the effectiveness of service provision, and will be affected by any such changes. Achieving buy-in is paramount to sustain successful change and progress in resource efficiency. Second, under a gain-sharing component, rewards or performance bonuses financed from realized cost savings may be provided to encourage participation and commitment of these stakeholders.

Table 4: Summary of Standard RM Practices

RM Practice	Description	Present
1. Establish Baseline Cost, Performance and Service Levels	♦ Define scope and service levels	
	♦ Identify existing contract and compensation methods	X
	♦ Validate service levels with total costs	
	♦ Establish cost and performance benchmarks and goals	
2. Rethink Contractor Roles and Relationships	♦ Allow or require bidders to submit operations plans for achieving specified improvements in existing operations, provide latitude in work specification	
	♦ Engage RM contractor in daily RM operations and responsibilities	
	♦ Allow or require contractor to interface with internal stakeholders (engineers, legal staff, purchasing, other contractors) to devise cost-effective solutions, assure buy-in, and foster organizational learning	
	♦ Establish quarterly meetings to report on performance and resolve issues	
3. Align Waste and Resource Efficiency Services	♦ Coordinate, integrate, and formalize all contracts and services included in the baseline and subsequent scope of services to ensure that all are mutually supportive of organizational resource efficiency goals	
4. Establish Transparent Pricing for Services	♦ Delineate pricing information for specific services such as container maintenance, container rental, hauling, disposal, etc. (***This allows variable price savings, such as "avoided hauling and disposal" to flow back to generator and/or be used as a means for financing performance bonuses***).	
5. Cap Compensation for Garbage Service	♦ De-couple contractor profitability from waste generation and/or service levels by establishing a limit on compensation that will be provided for trash service that decreases gradually over time. (***Based initially on reasonable estimates of current hauling/disposal service costs as per practice 1***).	
	♦ Establish service as "on-call"	
6. Provide Direct Financial Incentives for Resource Efficiency	♦ Establish compensation that allows contractor to realize financial benefits for service improvements and resource efficiency innovations that result in cost savings	

3. *Align Waste and Resource Efficiency Services*. The current paper recycling service was established as a peripheral contractual responsibility of the waste vendor. As a result, the trash contractor has little motive to maximize diversion because this service is not a core part of its business, does not drive its profitability, and is therefore not on an equal footing with trash service.

   An RM contract (or RM practices applied internally) would bring recycling and source reduction from a marginal position to center stage by creating a profit motive for alignment with any resource- and cost-efficiency objectives Fitchburg establishes. For example, an RM contractor might reduce disposal service and provide additional recycling bins and service, as suggested in section 4. Alternatively, Fitchburg can itself act as its own RM by dedicating internal resources (through Facilities Maintenance or another internal group) to aligning, managing and monitoring services to guide higher resource efficiency. An external contractor, however, may perform this function more effectively and consistently, at lower cost. Aligning waste and recycling relies on the remaining practices to revisit and specify pricing to provide incentives for desired services and limit disposal service.

4. *Establish transparent pricing for services.* Under its current trash contract, all services are bundled into a standard monthly charge resulting in Fitchburg's inability to realize any savings through more efficiently using materials, or recycling a higher percentage of discards. Currently, any efficiencies on trash hauling/disposal reduction (such as summer time slow down and service reduction) flow back to the contractor. By delineating pricing information for specific services such as container rental, hauling, and tip fees, any savings through resource efficiency would flow back to Fitchburg, and can be used to selectively provide incentives to other desired services improvements and finance performance bonuses as described in practice 6. A change to more detailed pricing (including detailed billing) would allow Fitchburg to evaluate the "true" value of the services provided on a per unit basis, which may yield surprising results.

5. *Cap compensation for disposal service.* Under its current contract, Fitchburg receives regularly scheduled trash pick-ups. While it does not pay for these directly (i.e., on a "per haul/pick-up" basis), these costs are factored into the bundled monthly charge it pays on the basis of a regular schedule of pick-ups. In conjunction with more transparent pricing, Fitchburg may establish an "on-call" service so that hauls occur only as required. This would serve to increase haul efficiency, such as maximizing loads in order to minimize hauls, allowing costs savings to accrue to Fitchburg.

   Moreover, compensation for trash service can be constrained by setting a "cap" on trash based on the previous year's baseline as a means to decouple the contractor's profit source from providing waste service.

6. *Provide direct financial incentives for resource efficiency*. Fitchburg's current contract pricing structure does not reflect its preference for diverting materials over landfill or incineration. Because Fitchburg pays the same amount regardless of how

much it diverts, there is no financial driver for either Fitchburg or its contractor to achieve a higher recycle rate to save on disposal costs. Likewise, the profit incentive for the contractor rests in its disposal services – recycling represents a service that is offered free of charge to satisfy client needs while hopefully covering the costs of collection from recovered material returns. The status quo will likely remain until: (1) a pricing structure is established that sees cost savings flow back to Fitchburg, (2) recycling is included in the contract as a profit driver for the contractor, thereby making diversion the preferential option. This could occur by having avoided disposal costs and revenue on recycling accrue to Fitchburg State, which could use the savings as an incentive or "gain-sharing" component financed with any achieved costs savings.

Under RM, compensation is provided for through savings from increased recycling or source reduction and decreases in disposal service. RM presents a contract alternative that pursues source reduction by redistributing these responsibilities to a contractor whose core competency involves these tasks. The assumption is that the contractor will be able to add value and perform the same tasks more cost-effectively while freeing up Fitchburg to focus its resources elsewhere. This report identifies substantial "low-hanging fruit" from improved recycling at Fitchburg State College that may represent an opportunity for the contractor under an RM contract. Fitchburg could benefit from the additional services, expertise and RM contractor offerings to better document and align its trash and recycling services, and seek out source reduction in the longer-term.